

Report Information  
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## Interframe DPCM with robust median-based predictors for transmission of image sequences over noisy channels.

### Dialog eLinks

Full text options [ISPTD Full Text Retrieval Options](#)

### Accession number & update

0005210118 20070101.

### Source

IEEE Transactions on Image Processing, {IEEE-Trans-Image-Process-USA}, Jan. 1996, vol. 5, no. 1, p. 16-25, 25 refs, CODEN: IIPRE4, ISSN: 1057-7149. Publisher: IEEE, USA.

### Author(s)

Song-X, Viero-T, Neuvo-Y.

### Author affiliation

Song, X., Signal Process. Lab., Tampere Univ. of Technol., Finland.

### Abstract

A new image sequence coding technique based on robust median-based predictors is presented for the transmission of image sequences over noisy channels. We analyze the robustness of median-based predictors against channel errors. A heuristic algorithm for the design of a robust predictor from a given median-based predictor is presented. It is shown that with small modifications in terms of a necessary requirement for a median-based predictor to be robust against channel errors, the robustness of a given median-based predictor can be considerably improved. Simulations on a real image sequence show significant improvement over the conventional differential pulse code modulation (**DPCM**) at high bit error rate (BER) using this new technique. The technique does not increase the transmission rate. It is shown that the quality of reconstructed images obtained by robust median-based predictors can be further improved by postprocessing the image using a nonlinear detail-preserving **noise**-smoothing filter.

### Descriptors

DIFFERENTIAL-PULSE-CODE-MODULATION; FIR-FILTERS; IMAGE-CODING; IMAGE-RECONSTRUCTION; IMAGE-SEQUENCES; MEDIAN-FILTERS; NONLINEAR-FILTERS; PREDICTION-THEORY; SMOOTHING-METHODS; TELECOMMUNICATION-CHANNELS; VISUAL-COMMUNICATION.

### Classification codes

B6140C Optical-information-image-and-video-signal-processing\*;  
B6120B Codes;  
C1250 Pattern-recognition\*.

### Keywords

**interframe**-DPCM; robust-median-based-predictors; channel-errors; noisy-channels; image-transmission; image-sequence-coding; heuristic-algorithm; simulations; differential-pulse-code-modulation; high-bit-error-rate; BER; transmission-rate; reconstructed-images-quality; postprocessing; nonlinear-detail-preserving-filter; **nonlinear**-noise-smoothing-filter; FIR-median-filters.

### Treatment codes

T Theoretical-or-mathematical;  
X Experimental.

### Language

English.

### Publication type

Journal-paper.

### Availability

SICI: 1057-7149(199601)5:1L;16:IDWR; 1-9.  
CCCC: 1057-7149/96/\$05.00.  
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### Digital object identifier

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**Publication year**

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**Edition**

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**Copyright statement**

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**Comments on 'A subjective evaluation of noise-shaping quantization for adaptive intra-/interframe DPCM coding of color television signals' (by B. Girod et al.).**

**Dialog eLinks**

Full text options [USPTO Full Text Retrieval Options](#)

**Accession number & update**

0004041262 20070101.

**Source**

IEEE Transactions on Communications, {IEEE-Trans-Commun-USA}, Aug. 1991, vol. 39, no. 8, p. 1192, 1 refs, CODEN: IECMBT, ISSN: 0090-6778, USA.

**Author(s)**

De-Lameillieure-J, Bruyland-I.

**Author affiliation**

De Lameillieure, J., Bruyland, I., Lab. for Commun. Eng. & Inf. Transmission, State Univ. of Gent, Belgium.

**Abstract**

In the above named work by B. Girod et al. (see *ibid.*, vol.36, no.3, p.332-46, 1988), a stability condition for a **DPCM** (differential pulse code modulation) system with additional quantization error **noise** shaping has been proposed. In the present work, a correction of this stability condition is derived.

**Descriptors**

ENCODING; **NOISE**; PULSE-CODE-MODULATION; STABILITY-CRITERIA; VIDEO-SIGNALS.

**Classification codes**

B6120 Modulation-and-coding-methods\*.

**Keywords**

adaptive-intraframe-coding; **interframe**-coding; **DPCM**-coding; color-television-signals; differential-pulse-code-modulation; quantization-error-noise-shaping; stability-condition.

**Treatment codes**

T Theoretical-or-mathematical.

**Language**

English.

**Publication type**

Journal-paper.

**Availability**

CCCC: 0090-6778/91/0800-1192\$01.00.

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10.1109/26.134007.

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**Background separation/filtering for videophone applications.**

**Accession number & update**

0003875713 20070101.

**Conference information**

ICASSP 90. 1990 International Conference on Acoustics, Speech and Signal Processing (Cat. No.90CH2847-2), Albuquerque, NM, USA, 3-6 April 1990.  
Sponsor(s): IEEE.

**Source**

ICASSP 90. 1990 International Conference on Acoustics, Speech and Signal Processing (Cat. No.90CH2847-2), 1990, p. 1981-4 vol.4, 5 refs, pp. 5 vol. 2970. Publisher: IEEE, New York, NY, USA.

**Author(s)**

Harasaki-H, Yano-M, Nishitani-T.

**Author affiliation**

Harasaki, H., Yano, M., Nishitani, T., NEC Corp., Kawasaki, Japan.

**Abstract**

To increase efficiency on **interframe** coding and/or to preserve speaker privacy for videophone applications, a method for real-time background separation based on stereoscopic range finding is developed. The algorithm includes foreground center extraction, foreground **threshold** calculation, occlusion-free direct block matching with quadtree block subdivision, and contour segmentation using a motion edge. The algorithm is evaluated using a stereo-video sequence. For an application using the background separation technique, background filtering is introduced. Background filtering can decrease the number of inessential coded blocks, when applied to a motion-compensated hybrid differential pulse-code modulation (**DPCM**)/transform coder. If the cut-off frequency for filtering characteristics is further lowered, the filtering will conceal details in the background.

**Descriptors**

ENCODING; PICTURE-PROCESSING; REAL-TIME-SYSTEMS; VIDEOTELEPHONY.

**Classification codes**

B6430 Television-equipment-systems-and-applications\*;  
B6120B Codes;  
B6140C Optical-information-image-and-video-signal-processing;  
B6210D Telephony.

**Keywords**

videophone-applications; real-time-background-separation;  
stereoscopic-range-finding; foreground-center-extraction; foreground-  
**threshold**-calculation; occlusion-free-direct-block-matching; quadtree-  
block-subdivision; contour-segmentation; motion-edge; stereo-video-  
sequence; background-filtering.

**Treatment codes**

P Practical;  
T Theoretical-or-mathematical.

**Language**

English.

**Publication type**

Conference-paper.

**Availability**

CCCC: CH2847-2/90/0000-1981\$01.00.

**Digital object identifier**  
10.1109/ICASSP.1990.115901.  
**Publication year**  
1990.  
**Publication date**  
19900000.  
**Edition**  
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**Copyright statement**  
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## **Redundancy and irrelevancy reduction of TV–signals by interframe DPCM– coding.**

**Accession number & update**  
0002933693 20070101.

**Conference information**  
Signal Processing III: Theories and Applications. Proceedings of  
EUSIPCO–86: Third European Signal Processing Conference, The Hague,  
Netherlands, 2–5 Sept. 1986.

**Source**  
Signal Processing III: Theories and Applications. Proceedings of EUSIPCO–86: Third European Signal  
Processing Conference, 1986, p. 817–20 vol.2, 4 refs, pp. 2 vol. xxvi+1436, ISBN: 0–444–70085–4.  
Publisher: North–Holland, Amsterdam, Netherlands.

**Author(s)**  
Arp–F. Editor(s): Young–I–T, Duin–R–P–W, Biemond–J, Gerbrands–J–J.

**Author affiliation**  
Arp, F., Dept. of Electr. Eng., Wuppertal Univ., West Germany.

**Abstract**  
Deals with the description of an **interframe DPCM**–coder which is implemented according to earlier  
considerations. The experimental redundancy reduction fits the theoretically derived values only if the  
predictor is switched by a movement detector. The picture contents may be assumed to be generated by  
a composite source of differently stationary signals describing the unmoved background and the moving  
parts, respectively. The results show also that **noise** is a serious reason for failing in achieving desirable  
rates of redundancy reduction. An attempt is made for eliminating irrelevant structures of the picture  
contents by simulating visual properties of perception within the coding procedure. The relevancy of each  
differential signal value is determined on the basis of a nonlinear filtering procedure which is applied to  
the picture content. In this way the equispaced quantizing levels of the **DPCM**–coder are dynamically  
expanded. The result is a probability distribution with an increased non–uniformity and thus a reduced  
entropy of the differential signal.

**Descriptors**  
ENCODING; PULSE–CODE–MODULATION; REDUNDANCY; VIDEO–SIGNALS.

**Classification codes**  
B6120B Codes\*;  
B6140 Signal–processing–and–detection.

**Keywords**  
irrelevancy–reduction; TV–signals; **interframe**–DPCM–coding; redundancy;  
movement–detector; composite–source; unmoved–background; **noise**;  
visual–properties; differential–signal–value; equispaced–quantizing–  
levels; probability–distribution; entropy.

**Treatment codes**  
T Theoretical–or–mathematical.

**Language**  
English.

**Publication type**  
Conference–paper.  
**Publication year**  
1986.  
**Publication date**  
19860000.  
**Edition**  
1987016.  
**Copyright statement**  
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## **An adaptive three–dimensional predictor for DPCM coding of studio television signals.**

**Accession number & update**  
0002049711 20070101.

**Conference information**  
International Conference on Electronic Image Processing, York, UK,  
26–28 July 1982.

**Source**  
International Conference on Electronic Image Processing, 1982, p. 184–7, 3 refs, pp. viii+253. Publisher:  
IEE, London, UK.

**Author(s)**  
Westerkamp–D.

**Author affiliation**  
Westerkamp, D., Univ. Hannover, Hannover, West Germany.

**Abstract**  
A new adaptive prediction scheme is proposed for **DPCM**–coding of broadcast television signals with fixed length codewords. The adaptation of the prediction algorithm to the intra– or **interframe** type is done by the comparison of two activity functions. Only previously transmitted picture elements are used for the calculation of these activity functions, so no additional switching information has to be transmitted. To reduce the **noise** sensitivity of the decision algorithm a hysteresis is implemented. The performance of the proposed adaptive prediction scheme is compared to know fixed predictors by means of computer simulations and subjective tests using TV sequences.

**Descriptors**  
ENCODING; PULSE–CODE–MODULATION; VIDEO–SIGNALS.

**Classification codes**  
B6120B Codes\*;  
B6430 Television–equipment–systems–and–applications.

**Keywords**  
adaptive–three–dimensional–predictor; **DPCM**–coding; studio–television–signals; adaptive–prediction–scheme; broadcast–television–signals; fixed–length–codewords; activity–functions; hysteresis; computer–simulations; subjective–tests.

**Treatment codes**  
P Practical;  
T Theoretical–or–mathematical.

**Language**  
English.

**Publication type**  
Conference–paper.  
**Publication year**  
1982.  
**Publication date**

19820000.

**Edition**

1983006.

**Copyright statement**

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**Hybrid DFT/DPCM interframe image quantization.**

**Accession number & update**

0001736337 20070101.

**Conference information**

ICASSP 81. Proceedings of the 1981 IEEE International Conference on Acoustics, Speech and Signal Processing, Atlanta, GA, USA, 30 March–1 April 1981.  
Sponsor(s): IEEE.

**Source**

ICASSP 81. Proceedings of the 1981 IEEE International Conference on Acoustics, Speech and Signal Processing, 1981, p. 1121–4 vol.3, 5 refs, pp. 3 vol. 1291. Publisher: IEEE, New York, NY, USA.

**Author(s)**

Pearlman–W–A, Jakatdar–P.

**Author affiliation**

Pearlman, W.A., Jakatdar, P., Electrical, Computer & Systems Engng. Dept., Rensselaer Polytech. Inst., Troy, NY, USA.

**Abstract**

A non–adaptive scheme for encoding an image sequence is claimed to yield better results than any previous comparable **interframe** image coding method. The scheme uses a hybrid of two–dimensional transform coding for the spatial dimension and **DPCM** for the time dimension. Unlike previous efforts, which use discrete cosine transforms (DCT's) of image subblocks and suboptimal quantization, this utilizes a full image DFT and an optimal quantization algorithm. The results with the standard sixteen frame sequence of Walter Cronkite are visually superior to previous transform coding efforts, especially at rates lower than 1 bit/pixel/frame. The **signal**–to–noise ratios are higher than those of nonadaptive hybrid **DCT/DPCM** by 2.6 to 10.5 dB depending on rate.

**Descriptors**

FOURIER–TRANSFORMS; PICTURE–PROCESSING; PULSE–CODE–MODULATION.

**Classification codes**

B6140C Optical–information–image–and–video–signal–processing\*;  
C1250 Pattern–recognition\*.

**Keywords**

**interframe**–image–quantization; two–dimensional–transform–coding; **DPCM**;  
full–image–DFT; S/N–ratios.

**Treatment codes**

T Theoretical–or–mathematical.

**Language**

English.

**Publication type**

Conference–paper.

**Publication year**

1981.

**Publication date**

19810000.

**Edition**

1981010.

**Copyright statement**



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## Quantiser selection for interframe differential pulse code modulation of television pictures.

### Dialog eLinks

Full text options [USPTO Full Text Retrieval Options](#)

### Accession number & update

0001358755 20070101.

### Source

Electronics Letters, {Electron-Lett-UK}, 1 March 1979, vol. 15, no. 5, p. 142-4, 7 refs, CODEN: ELLEAK, ISSN: 0013-5194, UK.

### Author(s)

Dennis-T-J.

### Author affiliation

Dennis, T.J., Dept. of Electrical Engng. Sci., Univ. of Essex, Colchester, UK.

### Abstract

A procedure based on subjective and objective assessments has been used to design an 8-level quantiser for an **interframe** d.p.c.m. digital television coding system handling monochrome 5.5 MHz 625 line pictures. The quantiser reduces **noise** in a static picture over its 8-bit source and attempts to minimise the distortion of movement.

### Descriptors

ENCODING; PULSE-CODE-MODULATION; VIDEO-SIGNALS.

### Classification codes

B6120B Codes\*;

B6430 Television-equipment-systems-and-applications.

### Keywords

**interframe**-differential-pulse-code-modulation; objective-assessments;  
8-level-quantiser; digital-television-coding-system; monochrome-5.5-  
MHz-625-line-pictures; **DPCM**; subjective-assessments; monochrome-TV;  
**noise**-reduction; movement-distortion-minimisation.

### Treatment codes

X Experimental.

### Language

English.

### Publication type

Journal-paper.

### Publication year

1979.

### Publication date

19790301.

### Edition

1979006.

### Copyright statement

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## Combined spatial and temporal coding of digital image sequences.

**Accession number & update**

0000945856 20070101.

**Conference information**

Proceedings of the Society of Photo-Optical Instrumentation Engineers, vol.66. Efficient Transmission of Pictorial Information, San Diego, CA, USA, 21-22 Aug. 1975.

Sponsor(s): Soc. Photo-Optical Instrumentation Engrs; US Army Electronics Command; et al.

**Source**

Proceedings of the Society of Photo-Optical Instrumentation Engineers, vol.66. Efficient Transmission of Pictorial Information, 1975, p. 172-80, 11 refs, pp. x+230. Publisher: Soc. Photo-Optical Instrumentation Engrs, Palos Verdes Estates, CA, USA.

**Author(s)**

Roese-J-A, Robinson-G-S. Editor(s): Tescher-A-G.

**Author affiliation**

Roese, J.A., Naval Undersea Center, San Diego, CA, USA.

**Abstract**

**Interframe** coding of television images encompasses techniques which make use of the correlations between pixel amplitudes in successive frames. Intraframe coding techniques that exploit spatial correlations can, in principle, be extended to include correlations in the temporal domain. In this paper, successive frames of digital images are coded using two-dimensional spatial transforms combined with **DPCM** in the temporal domain. Specific transform techniques investigated are the two-dimensional cosine and Fourier transforms. Hardware implementation of the Fourier transform involves manipulation of complex numbers where the cosine transform does not. However, the Fourier transform is attractive because frame-to-frame motion compensation can be introduced directly in the phase plane by application of appropriate phase correction factors. Results are presented in terms of coding efficiency, storage requirements, computational complexity, and sensitivity to channel **noise**.

**Descriptors**

ENCODING; PICTURE-PROCESSING; VIDEO-SIGNALS.

**Classification codes**

B6120B Codes\*;  
B6140C Optical-information-image-and-video-signal-processing;  
B6430 Television-equipment-systems-and-applications;  
C1250 Pattern-recognition\*.

**Keywords**

temporal-coding; digital-image-sequences; spatial-correlations;  
spatial-transforms; **DPCM**; Fourier-transforms; two-dimensional-cosine-transforms.

**Treatment codes**

T Theoretical-or-mathematical.

**Language**

English.

**Publication type**

Conference-paper.

**Publication year**

1975.

**Publication date**

19750000.

**Edition**

1976008.

**Copyright statement**

Copyright 1976 IEE.

## **Video transmission network with intraframe DPCM and optional interframe coding.**

### **Accession number & update**

0000473277 20070101.

### **Conference information**

Proceedings of the IEEE 1972 International Conference on Communications, Philadelphia, PA, USA, 19–21 June 1972.  
Sponsor(s): IEEE.

### **Source**

Proceedings of the IEEE 1972 International Conference on Communications, 1972, p. 39–1/6 pp., 12 refs, pp. xviii+1154. Publisher: IEEE, New York, NY, USA.

### **Author(s)**

Thoma–W. Editor(s): Salati–O–M, Weinrich–A–W.

### **Author affiliation**

Thoma, W., Siemens AG, Munich, West Germany.

### **Abstract**

The author discusses an intraframe **DPCM** videophone transmission network in whose high–cost circuit paths (e.g. long–haul lines) the bit rate can be optionally furthermore reduced by **interframe** codecs. The **interframe** codecs operate remotely from the intraframe **DPCM** codecs and do not add further quantizing **noise** to the video signal. The most important source coding problems for such a system are investigated. It is found that in a videophone network a frame memory should be used for repeating and not predicting picture elements. A new predicting algorithm for intraframe **DPCM** codecs is presented which makes use of horizontal and vertical picture correlations, leads to finite error propagation after transmission errors, and allows further bit rate reduction by frame repeating. Experiments have shown the resulting number of bits per picture element after **interframe** coding to be about 1.5 without use of buffer memories and adaptive means.

### **Descriptors**

CODES; INTERFERENCE; MODULATION; TELEPHONE–SYSTEMS.

### **Classification codes**

B6210D Telephony\*;  
B6430J Applications–of–television–systems.

### **Keywords**

videophone–transmission–network; **optional**–interframe–coding;  
differential–pulse–code–modulation.

### **Treatment codes**

P Practical.

### **Language**

English.

### **Publication type**

Conference–paper.

### **Publication year**

1972.

### **Publication date**

19720000.

### **Edition**

1973001.

### **Copyright statement**

Copyright 1973 IEE.

## Search Strategy

No.	Database	Search term	Info added since	Results
1	INZZ	compression	unrestricted	113968
2	INZZ	noise	unrestricted	337557
3	INZZ	threshold OR limit	unrestricted	392481
4	INZZ	difference OR subtract OR subtraction	unrestricted	295342
5	INZZ	1 AND 2 AND 3 AND 4	unrestricted	22
6	INZZ	interframe	unrestricted	1542
7	INZZ	dpcm	unrestricted	1691
8	INZZ	6 AND 7	unrestricted	102
9	INZZ	lossy OR irreversible	unrestricted	33524
10	INZZ	8 AND 9	unrestricted	1
11	INZZ	8 AND 2	unrestricted	14
12	INZZ	8 AND 3	unrestricted	2
13	INZZ	8 AND (2 OR 3)	unrestricted	15

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